

technology in the classroom

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Interactive Whiteboards: Creating Higher-level, Technological Thinkers?

A group of my preservice teachers recently observed a middle school social studies teacher teaching geography in an urban school in Texas. The teacher, who emphasized inquiry learning, assigned groups of middle school students to work together in designing pamphlets and travel brochures of Quebec. In the middle of the room, a large interactive whiteboard (IWB) was prominently displayed. As groups of students questioned where Quebec is located, the teacher used an overhead projector, and displayed a map on the wall, to instruct and scaffold instruction. Throughout the rest of the semester, the teacher used the overhead projector often, and the IWB was never used. In response to questions about her instructional choices, the teacher explained that her current computer was not compatible with the IWB.

The preceding vignette illustrates what often happens when schools obtain new technology, but have inadequate resources, or professional development, to use that technology (Higgins, Beauchamp, & Miller, 2007). In some cases, teachers are not prepared to make technology a critical element, or an interactive component, of classroom instruction (Knight, Pennant, & Piggott, 2004). Across the United States, many school districts are investing large sums of money to install IWBs in classrooms. For example, the Fort Worth Independent School District (FWISD) aims to become a "digital district" by installing IWBs into 5,000 classrooms over the next two years. This particular implementation of IWB technology in schools is the largest in the United States—and

a "key component of FWISD's 593.6 million bond program" (eschool news, Oct. 15, 2008). Other schools highlight how they are using IWBs within their district, such as the Tucson Unified School District (<http://edweb.tusd.k12.az.us/iw/index.asp>). This district provides a lesson planning website for IWBs. Great Britain leads the United States in the number of IWBs in use in the classroom. In London, for example, interactive whiteboards are used in about half of all classrooms (Paton, 2008). However, there is much criticism about the use of whiteboards in Great Britain's classrooms—including the charge that IWBs make students "spectators" instead of critical thinkers (Paton, 2008).

Schools are attempting to find ways to bridge the gap between the "haves" and "have nots"—searching for ways to better prepare students to compete globally. The digital divide is about more than who has access to technology; it is about who can create and express themselves using varied technologies (Hohlfeld, Ritzhaupt, Barron, & Kemker, 2008). A number of studies found that high-poverty area schools use computers primarily for math and reading instruction, whereas low-poverty area schools used computers for Internet functions (Becker, 2000; Coley, Cradler, & Engel, 1998; Smerdon et al., 2000; Wenglinsky, 2006). Although schools across socioeconomic lines generally have computers, the way in which computers and technology are used in the classroom varies greatly. When IWBs are only used for whole-class instruction—and students must wait and watch as their peers interact one-on-one with

the IWB—much instructional time is lost.

Some school districts are working to better provide inquiry-based technology classrooms. For example, the staff development blog *The Fischbowl* (<http://thefischbowl.blogspot.com/>) has received national attention for teacher development on the topics of constructivism and the use of technology to foster student-centered classrooms in the Littleton, Colorado, public schools. Their YouTube video, *Did You Know 2.0* (www.youtube.com/watch?v=pMcfrLYDm2U), was used repeatedly at professional development meetings for teachers during the past couple of years. This eye-opening video clip highlights our global, technologically changing society, with a goal towards encouraging educators to question how they are preparing students for a technologically literate world of the future. Without teaching students how to analyze, interpret, and compose using varied texts, both paper-based and technological, teachers are not preparing these students to become literate members of our technologically savvy world.

IWBs in the Classroom

IWBs were initially developed for and used in the business sector, but they eventually caught on in higher education (Murphy, Jain, & Spooner, 1995; Stephens, 2000); by the late 1990s, K-12 schools began integrating the technology (Moseley, Higgins, & Bramald, 1999). However, there is a lack of scientific studies on student achievement gains when IWBs are used for classroom instruction; despite this lack of research, a wealth of descriptive studies advocates for

using the technology (Cogill, 2003; Glover & Miller, 2001; Lantham, 2002; Levy, 2002; Smith, Higgins, Wall, & Miller, 2005; Stephens, 2000). The deficit of scientific studies does not seem to deter schools from purchasing IWBs, and many schools base their decisions on benefits listed in descriptive studies, such as greater student engagement and heightened interest in whole-class lessons.

Benefits and Drawbacks to IWBs in Schools

Some of the benefits of integrating such technology into classroom instruction include: meeting the needs of visual learners; more interactively teaching whole-class lessons; better engaging students (Wall, Higgins, & Smith, 2005); and using a variety of multimedia within a whole-class lesson—such as video, pictures, diagrams, and websites (Ekhami, 2002; Higgins et al., 2007; Johnson, 2002; Levy, 2002). The drawbacks to IWBs include the cost of equipping classrooms with the technology. These costs include not only buying the whiteboard (prices range from about \$800-2,500) but also equipping a classroom with an LCD projector (\$450-1,500), a computer, new software, and technology support. Most classrooms today have computers; however, as mentioned in the vignette beginning this column, the computer needs to be compatible with the IWB. Providing teachers with ongoing professional development on how to use the IWB effectively, and interactively, is also necessary. Integrating IWBs is a very expensive process—and some researchers found that despite having the new IWB equipment, some teachers did not teach interactive lessons (Knight et al., 2004), and some campuses struggle to keep IWB classrooms up-to-date (Debolt, 2008). Lastly, although initial research suggests that students are at first more motivated and

engaged to learn when taught using IWBs, according to a scientific study from the University of London, that engagement is short-lived (Moss et al., 2007). A statistical analysis of 30 schools using IWBs, composed of 9,000 students, found no increase in achievement in three core subject areas during the 2004/2005 school year (Moss et al., 2007). As these researchers say, “The main emphasis needs to rest with the appropriateness of the pedagogy, not the use of the technology per se” (p. 6). In all, school districts cannot expect transformational teaching and learning based on the simple addition of IWBs to a classroom.

Examples From an IWB English Classroom

As school districts consider such expensive purchases, they should evaluate which classrooms and teachers would use the technology most effectively. Math and science classrooms strongly benefit from the interactive nature of IWBs—as do English as a Second Language classrooms (ESL)—since these classes aim to provide interactive, hands-on learning. For example, many teachers at a Texas school for recently arrived immigrants and refugees effectively integrate the IWBs into classroom instruction. Over the course of a semester, I observed many of my college students work with their mentor middle school teachers to teach whole-class lessons using the IWB. For example, Sara, a future English teacher, used the IWB to help ESL students examine characters within a nonfiction chapter in their textbook. Using the IWB,

Sara displayed a chart (see Figure 1) on which she listed several descriptive words at the bottom; she had students walk to the IWB board and place the words in the correct column by dragging the cursor across the board. Students had several different choices for characters, like *grandfather* and *sister*, and they had to place reasonable characteristics in the columns next to that character's name. This particular activity was effective in discussing character traits—and nonfiction text—while also providing comprehensible input for newly arriving language learners. While the same activity could be taught using an overhead projector, the students appeared motivated and engaged to use the IWB.

Many of the ESL teachers I observed simply began with their typical daily oral language activity (DOL) when implementing the IWB into classroom instruction. A DOL is an incomplete, or grammatically incorrect, sentence or paragraph, that is typed on the IWB. Students then had to decide how to correct the sentence (Whittingham, 2007). Even though this activity is no different than the same DOL many teachers have been using with their chalkboards for the past 20 years, students seemed fairly engaged in correcting the DOL using technology. Unlike other classrooms, this ESL classroom had a small teacher-student ratio, and so the wait time in between students interacting with the whiteboard was minimal. Teachers who teach large classes may want to reconsider using only whole-class instruction, since much instructional time is wasted

Chart 1: Interactive Whiteboard Lesson

Character	What Character Looks Like	What Character Does	What Character Is Like

as students interact one-on-one with the board. Teachers also can move beyond traditional paper/pencil activities using the IWB by showcasing interactive websites, WebQuests, and video footage. They can use interactive compasses, graphs, and online books, or they can demonstrate how to conduct a science experiment. An online search for "interactive whiteboard resources" will yield a wealth of activities promoting interaction.

Conclusion

IWBs are an expensive form of technology—and there is no strong scientific research showing that students who are instructed by a teacher using an IWB have higher achievement. Instead of purchasing and equipping entire campuses with the technology, schools should selectively choose those teachers, and content areas, that will truly benefit from the technology. They also should ensure that the classroom technology is compatible with the new technology, while also providing teachers with ongoing assistance and professional development. Teaching using an IWB should move beyond simple tasks requiring lower level thinking to more inquiry-based and critical thinking assignments. Since only a few scientific studies support higher student academic achievement based on IWBs, districts may be wary of investing millions of dollars into a technology that will quickly grow outdated—and, if not implemented well, that teachers may not use effectively. What may be more important for students are teachers who initiate inquiry-based learning classrooms, and schools that provide smaller class sizes to allow more individualized interaction between teachers and students.

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